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Theoretical Basis for Composition of Economic Strategy for Industry Development

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Abstract:

The article deals with the issues related to analysis of domestic engineering problems with the assessment of the current state of the industry as a whole. Considering the prospects of exiting the current crisis, as well as long-term economic growth we expect general welfare within the sector. As the object of the study the authors have selected the engineering industry of the country. The subject of research is the economic relations between producers and consumers of engineering products, as well as issues of strategy formation and development of the engineering industry.

The authors analyzed the state of machine-manufacture and highlighted the problems, the solution of which is most relevant given the government policy of increased import substitution and enhanced productivity. Further analysis was carried out in the sphere of sources of financing and attraction of investment resources for all kinds of enterprises of mechanical engineering, on the basis of which economic development strategy for the industry may be constructed. In addition, the authors propose measures and concrete ways of solving the problems identified by the formation of economic strategy of development of the industry, involving plans of achievement of all the defined targets.

As a result of the study authors concluded that the need to stop subsidizing loss-making enterprises, creating a favorable climate for the development of venture companies, in order t introduce innovative technology as soon as possible. These technologies could subsequently be exported together with products of greater added value.

Key Words: *Machine-manufacturing industry, economic strategy, investments, innovations, government support.*

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1. Introduction

Machine-manufacturing industry, just like other sectors of the Russian economy, is in a situation of permanent influence of long-term systemic challenges that determine not only the global trends, but also internal destabilizing factors. Both financial and political crises have had a negative impact on the economy as a whole, but the industry is a kind of "framework" of the national economy, which is based on the defense and aerospace industry, and a number of other strategically important industries and areas of production. Also high level of development of machine-manufacturing and engineering industry helps to solve the problems of economic and social character, due to spillover effect. The role of the engineering industry for the country is further enhanced by the solution of such complex tasks, as import substitution, the reform of the military-industrial complex and modernization of manufacturing industries.

Thus, the aim of our research is to develop adequate current realities of the economic development strategy of the machine-manufacturing industry, taking into account all the problems as well as offering a balanced solution to them.

2. Base part of research

The above challenges necessitate the development of the economic development strategy for the industry, including its long-term investment plan. Challenges can be roughly grouped into the following categories:

1. Strengthening of competition on the global machine-manufacturing market. Prior to the 1990s, the leaders of machine-building were countries such as the USA, the USSR, Germany and Japan (Budik and Schlossberger, 2015). However by the 2000s the picture has changed dramatically, the place of undisputed leader in the production of machine tools was transferred to China, followed by Japan, Germany, Italy, South Korea and Taiwan. Japan, Germany and Italy dominate the production of the most complex and sophisticated machinery. According to Eurostat, the United States went down to 7th place in the world, and Russia is now 21st (Kondratiev). Nowadays, the mechanical engineering and metal processing account for about 20% of the total volume of industrial production in Russia, and the annual turnover of the industry is more than 55 billion US dollars. For comparison, in the US, Japan and Germany the share of engineering products as the total industrial production is around 36-45% (Zavalko). According to forecasts composed by IMF World Economic Outlook for 2025 the top producers will the countries that are now developing, with China, EU, USA and Japan still retaining the leading positions. The total volume of machine-building production will increase by 2025 to reach $ 930 billion, corresponding to an annual growth of 3.8% (Kondratiev).

2. New wave of technological changes in the industry, reinforcing the role and importance of innovations (Dasanayaka and Sardana, 2015; Giannarakis, 2016). A

new technological foundation is being formed, based, on utilizing IT and nanotechnology. Each year the US invests, on average 2-2.5% of GDP on scientific research in the sphere of manufacturing and engineering, and in the EU countries this proportion is 3% of GDP. In the US, the share of state financing of engineering projects can reach up to 50%. Given this, the process of adapting the achievements in the military and aerospace industry is then carried out. Germany has also carried out a series of reforms to renew the manufacturing sector, financing the operation through effective fiscal policy. Currently, every third manufacturing plant in Germany is considered innovative, with two-thirds of total engineering production being exported (Zavalko).

3. Increase in importance of role of human capital as the main factor of economic development, the deficit of qualified engineering workers, aging and deterioration of the qualitative composition of staff.

7-10 years ago, this given problem was attempted to be solve by trying to attract foreign staff, however foreign top-managers were not able to solve all the internal problems of the industry, due to not being familiar enough with Russian specifics (Sayfieva, Ermilina). In addition, the average age of skilled workers in the production is around 54-56 years (close to retirement), which means around 93% «deterioration of the productive forces» (Balti). Therefore, it is difficult to talk about the development of fundamentally new equipment as well as new ways to organize industrial relations. On the one hand, new technologies require fewer employees; on the other hand, not all companies can afford a radical modernization of production, in which there is a possibility for total failure of the working-machines and CNC machine tools. Today, the problem of training workers to operate with existing technologies is solved by qualification improving centers within the industries, consulting firms or by the enterprises themselves, although this area of interest and concern of the state.

4. Deterioration of raw materials export model of economic development of Russia as a result of volatile global energy market and the need to reorient financing of R&D from state funds to private funds, including, first of all the attraction of long-term investors (Medvedeva *et al.*, 2015; Mihola *et al.*, 2016).

Logically, the depletion of natural resources of the state must be compensated by the increase in assets sourcing from industrial production, and the technological reform should be facilitated by the scientific and technological achievements of the state. However, Russian export of raw materials on the contrary is increasing, along with the import of machinery, equipment and vehicles. Ready-made machinery accounting for nearly half of all Russian imports, while at the same time raw materials which accounts for more than half of Russian exports. This imbalance is reflected in deterioration of value of the national wealth, due to the fact that the decrease in natural resources is not compensated by the growth in fixed assets, i.e. cash flows generated in the sphere of material production, are not returned back to

the real economy in the necessary volumes. Furthermore the current investment insufficiency generates weakens the ties between production and R&D, which results in a negative impact on the state of technological development and innovative potential of the economy (Rodionova *et al.,* 2015; Salimova and Makolov, 2016; Thalassinos *et al.,* 2015; Theriou 2015).

5. Presence of administrative barriers, lack of innovation development. Increased industry investment in the periods of economic growth in the 2000s was not focused enough on the development of innovative sphere. Therefore, positive changes in the investment activities are embodied only in partial replacement of obsolete equipment in the leading enterprises. That was not enough to facilitate wide adoption of new technologies, growth of competitiveness and development of production in order to activate of import substitution (Pochukaeva). In Germany, 90% of expenditure on R&D is targeted at the manufacturing industry. Domestic manufacturing industry in recent years received 56-77% of total industry R&D expenditures (Pochukaeva).

At first glance the problems discussed seem distant from each other, but in reality they are interdependent as determined by the general economic development of the industry.

The aim of the economic development strategy of the engineering industry is the intensification of economic development and as a consequence, integration of Russian machine building market into the world community, as a leading manufacturer of high technology, high-tech products. This will bring Russian economy closer to the achievement of an adequate position among the world's machine-building producers. This goal can be achieved through the improvement of such areas as banking, insurance and private-enterprise sectors of the economy, promotion of large-scale long-term investment in technological upgrading as well as innovation in order to enhance industrial efficiency.

However, according to various research (Tsukhlo) the main obstacle for entreprise investment is consider the lack of own funds, because that profit is the most important source of capital expenditure in the Russian industry. As a rule, interest rates on loans are much higher than the projected profitability of manufacturing enterprises. Average return on assets in the engineering industry is 4.9% (Rosstat), which is a negative factor while obtaining a loan. In particular, loans to industrial enterprises in February 2015 were given out at the interest rate of 20.8% per annum in rubles, which decreased down to 16.5% per annum decreased by October 2015. The picture is further complemented by the complexity of the process of obtaining a bank loan, even if the offered bank rate acceptable to the company.

According to Aganbegian A.G., the lack of own funds of enterprises and organizations eliminates their opportunity to replenish the working capital funds and expand production through additional purchases of raw materials and components.

Enterprises face even more problems in finding funds for investment. When it comes to these problem Russian banks are bad assistants as the share of investment loans is as low as 6%. Of course, these loans do not play a significant role in the general flow of investments (Aghanbegyan). This results in a paradox: for an entreprise to obtain an investment loan, it must meet a number of conditions, in particular, seek the introduction of new technologies (use of innovative technologies), to actively modernize existing production, manufacture products certified in accordance with international standards, have sufficient technical and scientific capacity to develop innovative technologies and products that enable efficient production and personnel management standards as well as have a clean credit history and reputation. The obvious question here is: if the company already complies with all of the criteria stated above, why would it need an investment loan in the first place? It is a vicious circle. In order to obtain funding an appropriate level of economic development is required, and to achieve this level, enterprise needs funding.

The current situation for manufacturing enterprises is not the best; therefore it is important to promptly implement the development strategy of economic development of the industry. As follows from the analysis, the biggest problem is the lack of long-term investment in the industry due to the low rate of turnover of capital investment and high risk of innovation. In this regard, some researchers consider appropriate to increase involvement of national institutional support aimed at strengthening investment activities. "In the context of the indifferent attitude of private sector towards science and innovation, we believe it is appropriate along with measures of state support of innovation activity, to introduce the mechanism of economic, regulatory and technical coercion (technical regulation, standardization and control), forcing the company to produce competitive products. The practice of "compulsion to innovate" should apply to both industrial enterprises and financial institutions that provide investment resources (Pochukaeva).

We cannot say that the state does not provide support for the production sphere. Funds provided under the Federal Target Programs (FTP) are the main form of public investment.

Currently in the field of high-tech engineering there are 10 complex state program «The development of industry and improvement of its competitiveness» (2012-2020), «Development of Transport System» (2013-2020), «The development of the aviation industry for 2013 -2025s.», «The development of shipbuilding for 2013-2030», «Development of electronic and radio-electronic industry in the years 2013-2025», «Space activities in Russia for 2013-2020», «Development of science and technology» (2013 -2020), «Economic development and innovative economy» (2013-2020) «Energy efficiency and development» (2013-2020). The components of most of these government programs are the Federal Target Program (FTP) (Gutenev). To finance events envisaged by state programs federal budget has allocated more than 1 trillion rubles in 2013 alone. However the major bulk of funding comes from extra-budgetary sources, which allow spreading the risks

between the state and private companies, make sure that manufacturers do not lose the market initiative and stimulate economic efficiency in companies implementing state programs.
The next important block of measures of state support is system of subsidized interest rates on bank loans and contributions to the charter capital, aimed at the preservation and development of industrial capital industrial enterprises of machine-building industry.

In addition, the government funded R&D is outside the federal program framework, this includes the implementation of R&D contracts and scientific support for innovative projects of national importance. The state agencies prepared a set of regulatory and fiscal instruments, for the sustainable functioning of the machine-building enterprises, their innovative development and modernization, as well as equal conditions for entry into foreign markets and protection domestic market from import pressures. The system of technical regulation, standardization and system for ensuring the uniformity of measurements is currently being developed. Finally, the attraction of state institutions resources for development of investment projects, in particular, the resources from the National Welfare Fund (NWF) for the implementation of three key infrastructure projects. Those include the construction of high-speed highway Moscow - Kazan, the Ring Road and the development of the Trans-Siberian and Baikal-Amur Mainline. The highway Moscow - Kazan is expected volume of total investments is 930 billion rubles, 70% of which will be government money, with about 370 billion rubles coming directly from the budget, and another 280 billion rubles - from the National Welfare Fund (Gutenev).

However, the federal program is not implemented in all machine-building enterprises, and so many feel a damaging shortage of investment resources, particularly venture capital, young enterprise, implementation or development of new production technologies. An alternative may be in a form of borrowed funds, attracted by the stock market mechanism, through the placement of bonds. The issue and placement of bonds will allow borrowing in longer time spam, rather than a bank loan. Moreover bond loan servicing comes at a much lower cost when compared to bank loan servicing. Placement of bonds to a wide range of borrowers does not put the company in dependence on a limited number of investors, as if the company turned to private equity investors or through the issue of shares, which is impossible for small businesses, resulting in the form of sole enterprise. Another important advantage of bond placements for the enterprise is the statutory option to recognize interest payments on the bonds as production costs. Equity instruments are not very popular among the engineering companies as a type of funding resource, if we look at the shares of machine-building enterprises, presented in the index MICEX Engineering (MICEX MNF), virtually all of them receive public support, if not through subsidies, than through the state order. In such a situation it is difficult to speak of an objective assessment of mechanical engineering market through stock exchange, in fact, there are no full-fledged companies, working exclusively on the laws of the market economy in Russia.

Another type of economic stimulus for the development of machine-building is foreign direct investment. For foreign investors, the Russian machine-building is a priority investment destination. According to Rosstat investment into mechanical engineering as a share of the total volume of foreign direct investment it follows as 9% in 2005, 47% in 2010, and 32% at the end of 2015. During the global financial crisis of 2008 and the post-crisis period 2009-2010 manufacturing was the only area of production, where the slowdown in foreign direct investment wasn't observed. In the 2000s, the major bulk of FDI was directed into the automobile industry, the time period of foreign car companies actively entering the Russian market, a subsequent increase in the volume of investments was directed to place the industrial assembly of TV and video technology, as well as household and climate technology. This trend facilitated the development of the consumer market in the country, rather than the production market. It should also be noted, that the industrial assembly using imported components has little to do with the concept of a cross-sectoral cooperation, where one industrial enterprise stimulates the related enterprises. Therefore, it should be understood that in addition to quantitative indicators, there is also a qualitative analysis of the situation in the industry. Nominal growth of production in manufacturing is definitely increasing as a result of FDI, but not conducive to the development of cross-sectoral linkages and doesn't stimulate multiplicative growth of production in related industries.

The authors also point out another another important source of investment resources - amortization (depreciation). There is a long-dating need of revision of existing investment-amortization policy in the country. It also requires targeted adjustments, as the share of depreciation costs in relation to the value of fixed assets of manufacturing entreprises forms a very low percentage figure, and has a number of contradictions and controversies.

In economically developed countries, the average full-term renewal of capital does not exceed 15-20 years, and in the US the term update of the active part of capital is 12-14 years, and in Japan - 8-10 years (due to the concentration of capital in high-tech industries which is quicker to replace). In Russia, during the 90s the company used the amortization resources for other purposes. This is the main reason that the depreciation of fixed assets in the 2000s reached a catastrophic magnitude (Lugacheva).

Enterprise amortization policy in manufacturing industries should focus on development of an optimal scheme assigning the costs of non-current assets to the cost of production in order to increase the economic efficiency of financial instruments. Main problems for industrial enterprises: 1) method for calculating depreciation, 2) the use of amortization premium as a benefit when writing off costs of basic production assets (BPA), 3) the intended use of depreciation premiums.

In the United States, Germany and France the share of depreciation in the total structure of capital investments is constantly increasing. Over fifty years it has

almost doubled - from 25-30% to 60-70% (Panova). «Russia is not only lagging behind other industrially developed and even some developing countries, but does not use the accumulated during the existence of the USSR experience of reinvestment of depreciation write-offs. In recent years funding for reproductive processes due to the depreciation fund has no upward trend and stuck at 20 - 21% of the total investment (which is twice as less than in late 1980s.), and in equity means less than 50%.» (Panova). At the same time, one should not underestimate the fact that depreciation premium is not the same as an interest-free loan— its application at a rate of 10-30% at the effective rate of income tax of 20% means 2-6% tax discount from the original value of fixed assets (Panova). These funds can be targeted at the modernization and renewal of business equipment.

Another effective tool for enhancing innovation and investment activity of the manufacturing enterprises, due to amortization premiums, may be altering the life-span of BPA upwards or downwards. The legislation allows for the change in life-span of enterprise funds upwards after the reconstruction and modernization. Downwards - while reducing the life cycle of the goods, which is observed everywhere in the face of rapid scientific and technical progress. If we look in detail at this legislation and apply it to branch principles of management, then, for example, enterprises of the oil sector have a huge advantage over the rest, as their production equipment belongs to the first depreciation group and fully transfers its value to the products within one to two years. In other sectors for accounting purposes companies are forced to be installing lifetimes on their production equipment of the order of ten or more years. Collective machine-manufacturing is characterized by breakthrough technologies that fundamentally transform technological structure and consolidated views on production. At the same time there are problems with evaluations of duration of the period of good use for the equipment, since, change in the useful life of the smaller side could contribute to the process of updating BPA.

3. Results

Based on this analysis we can say that while developing the economic machinery industry strategy it is advisory to base the decision of such problems, as:

- the formation of innovative infrastructure, namely establishing engineering centers and technology parks for the implementation and application of R&D and standardization centers and the development of certification;
- provision of import-substitution of products and technologies in the industry;
- creation of favorable conditions for attracting investment in the creation of new industries and the development of enterprises in all spheres of machine-building production;
- improving the competitiveness of educational institutions and research centers engaged in developing innovative technologies;
- training skilled workers and management specialists for businesses in all areas of production engineering industry;

- creation of conditions for increasing the number of integrating-enterprises, i.e. the enterprises of small and anterior business , developing and implementing innovations, as well as performing the adjacent stall work, delivering the components, spare parts, etc.

The experience of advanced countries shows that the main direction of development of mechanical engineering in the last 10-15 years has been the separation of integrating producers and integrating suppliers. Producers - are, as a rule, large enterprises, engaged in a full production cycle, from the development, the subsequent integration into production and the process of production and sales. Suppliers - are companies, engaged in the development and manufacture of individual components, parts and systems. These integrators suppliers - are often, small companies or plants with narrow specialization, which often account for production parts and components, the so-called low technological limits. For small and medium enterprises, machine-manufacturing is a large field of activity as the major manufacturers are in need of suppliers, warehouse services, warranty services and repair services - all those areas that small and medium businesses can afford.

Medium and small businesses play a significant role in European engineering clusters, where the share of small and medium-sized businesses totals up to 80% of the total number of participants. The largest European companies in the field of cluster activities are composed on an average of about 300 small and SMEs, i.e. more than 60 % of the total number of cluster participants.

Another obvious conclusion of the study is to ensure that the economic development of Russia and its stability is determined by high technology integration, recognized by international standards. The role, devoted to scientific and technical progress in stimulating economic growth, accounts for more than 90%. In fact, now the growth is due to the design and development of new technologies. Enterprises that win this competition are able to utilize the new technologies in the most effective way. The main task to uphold competition in our country is, to select science-focused technologies, which Russia can objectively integrate into production and start manufacturing globally competitive products with high added value. Therefore, economic strategy of development of the industry should also be orientated on long-term sustainable development, and this should include mechanism for integration of high technologies, based on the harmonization of the domestic technological environment with advanced international standards in the field of technological compatibility, quality and certification standards. Modernization should be focused on accelerating the pace of innovation and development of new technologies production. This innovation cycle has to be comprehensive and balanced, covering the technological, industrial, economic and human resource components. In the long run, the industry performance will be determined by the intensity of innovation that is taking place now. Therefore the production base of machine-building enterprises formed today, will allow to attract investment from various sources tomorrow, ensuring the positive growth rate of investment in the industry.

4. Conclusions

Throughout the analysis of machine-manufacturing complex, we concluded that there were a number of factors, limiting the development of the industry, such as - the need to develop and innovate, lack of investment resources, personnel problems, import dependence in the conditions of realization of the import substitution program, the lack of a balanced manufacturer's support system. The possible ways of financing enterprises in machine-manufacturing at the present stage of development are: own funds, investment loans, private financing, and depreciation. The analysis of the practical implementation of the investment in machinery production, is based on the technological potential, and determines the level of production costs. Since the profitability of production in machine-manufacturing is the lowest amongst all manufacturing industries, this proves the ineffectiveness of the introduction of new equipment and innovative production technologies for the previous years. In this regard, we have developed goals and objectives of the economic development strategy of the engineering industry, including the search for optimal ways of financing projects of engineering companies, based on the conjugation of financial and innovation factors.

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